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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/667,714	09/22/2003	Christian L. Belady	200300765-1	9710
22879	7590	07/05/2006	EXAMINER	
HEWLETT PACKARD COMPANY P O BOX 272400, 3404 E. HARMONY ROAD INTELLECTUAL PROPERTY ADMINISTRATION FORT COLLINS, CO 80527-2400			CARPIO, IVAN HERNAN	
			ART UNIT	PAPER NUMBER
			2841	

DATE MAILED: 07/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	10/667,714		BELADY, CHRISTIAN L.	
	Examiner		Art Unit	
	Ivan H. Carpio		2841	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 April 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 21-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

The applicant's first argument, with regards to claim 1, is that Rumbut does not teach a sealed electronics module, examiner respectfully disagrees. Rumbut teaches that the module is a sealable enclosure (column 2, lines 44-49) and further states that the rear panel is sealed with a silicone-based synthetic gasket, hence a sealed electronics module. The applicant's second argument, with regards to claim 1, is that Rumbut does not specifically teach that the liquid cooling module is detachably connected to the liquid transporting means, examiner agrees but the claim is still not allowable, a new rejection is written below. The applicant's third argument, with regards to claim 22, is that Rumbut does not teach that the electronic modules are dynamically operably connected to each other, examiner respectfully disagrees. An operable connection is one in which signals, physical communication flow, and/or logical communication flow may be sent and/or received, it is evident from the structure of figure 2 that the cooling liquid flow is the physical communication flow and that indeed the electronic modules are dynamically operably connected. The applicant's fourth argument, with regards to claim 23, is that Rumbut does not teach that the electronic modules are sealed with respect to electromagnetic interference, examiner respectfully disagrees. The example given in the applicant's specification (Page 7) is not limiting and therefore does not limit the scope of the claim, claim 4 of the Rumbut teaches that the enclosure is fabricated with an electrostatic and electromagnetic shielding material therefore the reading is appropriate and sufficient to seal the electronic module with

Art Unit: 2841

respect to electromagnetic interference. Applicant's fifth argument, with regards to claims 24, 26, and 28 is that the office action provides no rationale for the 102(b) rejection as being anticipated by Rumbut. Examiner acknowledges a typo on page 5 of the office action, "Claims 21-28 are rejected under 35 USC 102(b) as being anticipated by Rumbut (US Patent 5740018)" should read "Claims 21-23,25 and 27 are rejected under 35 USC 102(b) as being anticipated by Rumbut (US Patent 5740018)" the correction has been made. The applicant's sixth argument, with regards to claim 27, is that Rumbut does not teach a rack configured to mount the one or more liquid cooling modules, examiner respectfully disagrees. Rumbut's figure 2 clearly shows that the liquid module is mounted on the rack, the manner in which it is mounted is not specific and therefore the reading is correct. The applicant's seventh argument, with regards to the 103(a) rejection of claim 24, is that that the office action does not ascertain the level of ordinary skill, examiner respectfully disagrees. The level of ordinary skill in the art is ascertained by the description of examples and uses of specific components, in particular the 103(a) rejection of claim 24 states "It is well known in the art to have microprocessors, memory chips, controller chips and/or power subsystem components on circuit boards for the purpose of accomplishing specific functions. For example many circuit boards have processors and memory chips, such as motherboards, for the purpose of processing, analyzing and manipulating data and then storing the resultant data for later usage.", in fact open up any computer, network server, palm pilot, cell phone and many other electronic devices and you will find these components. The applicant's eighth argument, with regards to claim 28, is that the 103(a) rejection is

Art Unit: 2841

improper because a redundant fail over system requires two or more liquid modules and that it is impossible to configure Rumbut in a redundant fail over system configuration, examiner respectfully disagrees. Rumbut teaches only one liquid cooling module and this is why it's a 103 and not a 102 rejection, it is not hard to see that a person that can connect a single liquid cooling module could and would also connect more than one liquid cooling modules to form a redundant system incase one liquid cooling module fails, and that this connection is far from impossible since it requires the same scheme as that of connecting a single module. The last argument with regards to claim 26 is that it depends from claim 21 and thus does not teach the missing detachable connection, this argument is moot in view of new rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 21,22,23,24,25 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rumbut.

With respect to claim 21 Rumbut teaches a liquid cooled modular electronics system (Fig. 2), comprising: one or more sealed electronics modules (Fig. 1, element 100, and Fig. 2), a sealed electronics module including: one or more electronics

Art Unit: 2841

components arranged within the sealed electronics module (Fig. 1, element 150 Note: components not shown but are inherent on circuit boards); one or more connectors (Fig. 1, elements 109, 118) attached to the sealed electronics module, the connectors configured to provide one or more detachable connections between the sealed electronics module and liquid transporting means (Fig. 2, elements 209 as 224) for providing liquid communication between the sealed electronics module and one or more external liquid cooling modules (Fig. 2, element 250); and means (Fig. 1, element 103) arranged within the sealed electronics module for dissipating heat generated by one or more of the one or more electronics components using liquid that is transported between the sealed electronics module and the external liquid cooling module; and one or more liquid cooling modules, a liquid cooling module including: one or more connectors (Fig. 2, the ends of elements 212 and 218) attached to the liquid cooling module, means arranged within the liquid cooling module for receiving a liquid to be cooled; means (column 4, lines 13-31) arranged within the liquid cooling module for cooling the liquid to be cooled into a cooled liquid; means (Fig. 1, element 103) arranged within the liquid cooling module for providing the cooled liquid to one or more sealed electronics modules via the liquid transporting means; and means (column 3, lines 45-55) arranged within the liquid cooling module for dissipating heat transferred to the liquid cooling module from the liquid to be cooled; where the one or more liquid cooling modules and the one or more sealed electronics modules are separate modules that can be selectively connected together by the one or more detachable connections to establish liquid communication there between. Rumbut does

Art Unit: 2841

not specifically teach that the connectors configured to provide one or more detachable connections between the liquid cooling module and the liquid transporting means.

Detachable connections are well known in the art, and come in a variety of different configurations, Figure 1 and Figure 2 of Rumbut show that the sealed electronics module are detachably connected by the use of threads and screws. It would have been obvious to one of ordinary skill in the art at the time of the invention to make the connectors configured to provide one or more detachable connections between the liquid cooling module and the liquid transporting means, using the configuration taught by Rumbut in Fig. 1 and Fig. 2, as pertains to the detachable connection of the electronics module, because doing so allows the liquid cooling module to be easily removed and fixed or replaced without the need to replace the entire set up.

With respect to claim 22 and with all the limitations of claim 21, Rumbut teaches that one or more sealed electronics modules are configured to be dynamically operably connected (Fig. 2, note that two or more electronic modules are connected by elements 209 and 212) by a detachable connection to one or more second liquid cooled electronics modules.

With respect to claim 23 and with all the limitations of claim 21, Rumbut teaches that the one or more sealed electronics modules are sealed with respect to electromagnetic interference (Claim 4).

With respect to claim 25 and with all the limitations of claim 21, Rumbut teaches that the one or more sealed electronics modules are configured to be in liquid communication (Fig. 2, liquid communication occurs through liquid transporting means)

with one or more second sealed electronics modules via the one or more detachable connections.

With respect to claim 27 and with all the limitations of claim 21, Rumbut teaches a rack (Fig.2, element 200) configured to mount the one or more sealed electronics modules and the liquid cooling module.

With respect to claim 24 and with all the limitations of claim 21, Rumbut teaches all of the limitations except that the one or more electronic components include one or more of, a microprocessor, memory chip, controller chip and a power subsystem component. It is well known in the art to have microprocessors, memory chips, controller chips and/or power subsystem components on circuit boards for the purpose of accomplishing specific functions. For example many circuit boards have processors and memory chips, such as motherboards, for the purpose of processing, analyzing and manipulating data and then storing the resultant data for later usage. It would have been obvious to one of ordinary skill in the art at the time of the invention to have processors and memory chips on the circuit boards of the liquid cooling system, taught by Rumbut, for the purpose of processing and storing data while maintaining proper operating temperature.

With respect to claim 28 and with all the limitations of claim 21, Rumbut teaches all of the limitations except that the liquid cooling modules are configured in a redundant fail-over system. Redundancy is a very well known and used method in many systems, for example in electrical systems redundancy is used for power supply units to assure that if one power unit goes down another kicks in, it is also used in cooling systems

Art Unit: 2841

when one fan fails another starts etc. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a redundant fail-over system with the liquid cooling modules, taught by Rumbut, so that if one liquid cooling module fails another cooling module starts working thus protecting the temperature sensitive components on the circuit board.

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Quernemoen (US patent 6453169) in view of Rumbut.

With respect to claim 26 Quernemoen teaches all of the limitations including an electronics system being a scaleable M processor server (Fig. 1, element 22 and column 6, second paragraph) but does not teach the liquid cooling system comprising a sealed electronics module; one or more electronics components arranged within the sealed electronics module; one or more connectors attached to the sealed electronics module, the connectors configured to provide one or more detachable connections to liquid transporting apparatus, the liquid transporting apparatus configured to provide liquid communication between the sealed electronics module and an external liquid cooling module; and a cooling apparatus arranged within the sealed electronics module that cools the one or more electronics components using liquid that is transported between the sealed electronics module and the external liquid cooling module. Rumbut teaches a liquid cooling system comprising, comprising: one or more sealed electronics modules (Fig. 1, element 100, and Fig. 2), a sealed electronics module including: one or more electronics components arranged within the sealed electronics module (Fig. 1, element 150 Note: components not shown but are inherent

Art Unit: 2841

on circuit boards); one or more connectors (Fig. 1, elements 109,118) attached to the sealed electronics module, the connectors configured to provide one or more detachable connections between the sealed electronics module and liquid transporting means (Fig. 2, elements 209 as 224) for providing liquid communication between the sealed electronics module and one or more external liquid cooling modules (Fig. 2, element 250); and means (Fig. 1, element 103) arranged within the sealed electronics module for dissipating heat generated by one or more of the one or more electronics components using liquid that is transported between the sealed electronics module and the external liquid cooling module; and one or more liquid cooling modules, a liquid cooling module including: one or more connectors (Fig. 2, the ends of elements 212 and 218) attached to the liquid cooling module, the connectors configured to provide one or more detachable connections between the liquid cooling module and the liquid transporting means; means arranged within the liquid cooling module for receiving a liquid to be cooled; means (column 4, lines 13-31) arranged within the liquid cooling module for cooling the liquid to be cooled into a cooled liquid; means (Fig. 1, element 103) arranged within the liquid cooling module for providing the cooled liquid to one or more sealed electronics modules via the liquid transporting means; and means (column 3, lines 45-55) arranged within the liquid cooling module for dissipating heat transferred to the liquid cooling module from the liquid to be cooled; where the one or more liquid cooling modules and the one or more sealed electronics modules are separate modules that can be selectively connected together by the one or more detachable connections to establish liquid communication therebetween.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the liquid cooled modular electronic system, taught by Rumbut, with the scaleable M processor server, taught by Quernemoen, for the purpose of maintaining proper component temperature while at the same time allowing for easy assembly and disassembly of the liquid cooling system furthermore the liquid cooled modular electronic system allows for replacing components and circuit boards with out the need to replace or alter the cooling system.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patent 5675473 discloses a liquid cooled modular system with connectors.

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ivan H. Carpio whose telephone number is 571-272-8396. The examiner can normally be reached on M-R 6:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kammie Cuneo can be reached on 571-272-1957. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2841

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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